CRITICAL REVIEW

Cognitive Rehabilitation: How it is and how it might be

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Abstract

This paper suggests there are, at present, four main kinds of cognitive rehabilitation programs for brain injured people. The first attempts to rehabilitate cognitive deficits through drills and exercises. The second uses theoretical models from cognitive psychology to identify deficits in order to remediate them. The third is primarily a patient-driven approach that uses a combination of learning theory, cognitive psychology, and neuropsychology to identify and remediate cognitive difficulties. The fourth is the holistic approach that has, as its basic philosophy, a belief that cognitive functions cannot be divorced from emotion, motivation, or other noncognitive functions, and consequently all aspects of functioning should be addressed in rehabilitation programs. Despite some overlap between these approaches, there are major differences. The two main arguments offered in this paper are (1) that the first two approaches do not lead to good clinical rehabilitation practice; and (2) that a synthesis of the second two approaches would result in the best cognitive rehabilitation model. (JINS, 1997, 3, 487–496.)

Keywords: Rehabilitation, Cognitive, Brain injury

The Meaning of the Term “Rehabilitation”

Definitions of rehabilitation abound, and while most would seem to capture something of what people working in the field mean by the term, none of them have achieved general consensus. The term itself comes from “habilitation” meaning “to make able,” so, at one level, rehabilitation means “to make able again.” However, it is clearly recognized by rehabilitation workers themselves that it is often impossible to make brain injured people able again if by this expression we mean, “to restore them to their former selves.”

As is frequently the case when arguing philosophically, dictionary definitions at the surface level of language are unhelpful. The Concise Oxford Dictionary, for example, defines “rehabilitate” as “1. to restore to effectiveness or normal life by training etc. especially after imprisonment or illness. 2. to restore to former privileges or reputation or a proper condition” (Allen, 1990, p. 1012). The blanket emphasis on restoration make these definitions inapplicable to the aims, practice, or outcomes of cognitive rehabilitation as experienced generally by patients and rehabilitation workers.

Perhaps a more helpful definition is that offered by the World Health Organization at a meeting in Finland in 1986 when they stated:

Rehabilitation implies the restoration of patients to the highest level of physical, psychological and social adaptation attainable. It includes all measures aimed at reducing the impact of disabling and handicapping conditions and at enabling disabled people to achieve optimum social integration. (p. 1)

This definition avoids goals that, given the state of our present knowledge and abilities, are unobtainable because they imply restoration of function or recovery. While suggesting more realistic aims that would lead to a reduction in the impact of disabling and handicapping conditions, it nevertheless recognizes that rehabilitation goals can be set to achieve the highest levels possible, including optimum social integration. This definition offers a framework within which rehabilitation workers can set realistic objectives, practice effective therapy and achieve obtainable outcomes.

One element missing from the WHO definition is any reference to the involvement of the disabled person. McLellan (1991) argues that rehabilitation is a two-way, interactive process. Unlike medical treatment, which is something given to people to help them recover from an injury or illness, or to make them feel better, rehabilitation, in order to be effec-
tive, must involve the disabled patient. McLellan expands this point to include others besides the patient and therapist when he writes: “Rehabilitation is a process whereby people who are disabled by injury or disease work together with professional staff, relatives and members of the wider community to achieve their optimum physical, psychological, social and vocational wellbeing” (p. 785).

There are many other definitions of cognitive rehabilitation to which we could refer, but I would hope that the two I have quoted are sufficiently all-embracing for the purposes of this discussion. For example, a recent definition by Ben-Yishay (1996) would sit comfortably within the framework offered by the above: “...the rehabilitation of a head-injured person is, principally, a task of aiding that person to speak and act in a way which optimizes his or her adaptability and sense of belonging” (p. 341).

So far, we have examined the meaning of rehabilitation in general, rather than cognitive rehabilitation specifically. The term “cognitive rehabilitation” gained popularity in the 1980s after Gianutsos and Gianutsos (1980) described this branch of rehabilitation as “...a service designed to remediate or alleviate disorders of perception, memory and language” (p. 37). Most of us today would perhaps find this definition too limiting, although a more recent definition from Wood (1990) is, I suggest, too imprecise, when he writes: “Cognitive rehabilitation utilises an assortment of procedures to improve or restore a diverse collection of abilities and skills” (p. 3). Perhaps more acceptable is Ben-Yishay and Prigatano’s (1990) attempt to define cognitive rehabilitation, which they describe as “...the amelioration of deficits in problem solving abilities in order to improve functional competence in everyday life situations” (p. 395).

My own attempt at a definition has been influenced by the WHO statement, by Miller’s (1984) book, and by discussions with Lindsay McLellan. In 1989 I suggested:

_The term “cognitive rehabilitation” can apply to any intervention strategy or technique which intends to enable clients or patients, and their families, to live with, manage, by-pass, reduce or come to terms with cognitive deficits precipitated by injury to the brain._ (p. 117)

I extended this in 1996, when I wrote, “Cognitive rehabilitation is a process whereby brain injured people work together with health professionals to remediate or alleviate cognitive deficits arising from a neurological insult” (p. 637).

**A Brief History of Cognitive Rehabilitation**

The earliest known document about treatment of people with head injury is Egyptian, dating from 2,500 to 3000 years ago, and discovered by Smith and Luxor in 1862 (quoted by Walsh, 1987). Many techniques used today were anticipated by Itard in the 18th century, when he was working with Victor, the Wild Boy of Aveyron (Lane, 1977).

Boake (1996) says that “neuropsychological rehabilitation may be almost as old as neuropsychology itself” (p. 241). He goes on to describe Broca’s successes and failures in teaching an aphasic patient to read (see Berker et al., 1986).

However, rehabilitation that would be more recognizable as such by practitioners of today probably began in Germany during World War I, as a result of improvements in the survival rates of head injured soldiers (Goldstein, 1942). Goldstein stressed the importance of cognitive and personality deficits following brain injury, and touched upon principles that could now be called “cognitive rehabilitation strategies” (Prigatano, 1986).

Jefferson (1942) wrote, “Although it is a new word, rehabilitation is an old purpose. All medical treatment has basically no other aim” (p. 296). A further impetus to rehabilitation came during World War II, with developments in Germany, Great Britain, the Soviet Union, and the United States. An important paper by Zangwill appeared in 1947 in which he discusses, among other things, the principles of reeducation, and referred to the following three main approaches: compensation, substitution, and direct retraining.

In the Soviet Union, during and after World War II, Luria and his colleagues were active in neuropsychological rehabilitation at a time when Luria was responsible for organizing a hospital for head injured soldiers (Luria, 1979). As Boake (1989) tells us, Luria noted that over 800 soldiers who had sustained brain injury from gunshot wounds were treated in this hospital by 1943. The publications of Luria (1963, 1970) and by Luria et al. (1969) still provide a rich source of material for contemporary neuropsychologists interested in cognitive rehabilitation.

In the USA those people influential in the development of cognitive rehabilitation programs were Aita (1946, 1948), Granich (1947), and Wepman (1951). After the Second World War and its immediate consequences, things were quiet, in a worldwide sense, until the publication of two conference proceedings (Walker et al., 1969; Hook, 1972). The Israeli wars prompted further development of rehabilitation programs, such as those described by Najenson et al. (1974) and Ben-Yishay (1978). At the same time, greater numbers of survivors from road accidents probably prompted the growth of specialist rehabilitation centers in the USA, such as the Rancho Los Amigos Hospital in California (Malkmus et al., 1980). The first program to call itself a “cognitive rehabilitation program” was probably that of Diller in New York in 1976 (see Diller et al., 1977, for a description).

A more detailed history of neuropsychological (including cognitive) rehabilitation can be found in a special issue of the journal _Neuropsychological Rehabilitation_, edited by Boake (1996).

**Impairments, Disabilities, and Handicaps**

Using the World Health Organization’s (1980) conceptual framework, we can classify the sequelae of brain injury into _impairments, disabilities, and handicaps_. Impairments can be regarded as damage to physical or mental structures (for example, temporal lobe damage), disabilities refer to the par-
ticular problems caused by the impairment (for example, a patient forgetting to take medication), and handicaps can be seen as problems imposed by society because of someone’s disability (for example, a person in a wheelchair is handicapped in a building without wheelchair access but not in a building with wheelchair access).

Figure 1 illustrates how impairments, disabilities and handicaps might result from a head injury or stroke.

Cognitive neuropsychologists typically treat impairments, identified by scores on tests, rather than disabilities, which are the ways impairments manifest themselves in the form of everyday problems encountered by the affected person, or handicaps, which are experienced by the patient because of social or environmental inadequacies.

How is the effectiveness of a program that treats impairments to be evaluated? Whyte (in press) argues that the simplest way is to use congruent outcome assessment, whereby the outcome measurement is congruent with the level of intervention. That is to say, if one is treating impairments, the outcome measure should be a measure of impairment, and, if one is treating a disability, then the outcome measure should be a measure of disability.

Given that rehabilitation is concerned with the treatment of disabilities, it follows from the above argument that the effectiveness of any particular rehabilitation program will be measured in amounts of reduction in disability experienced by the patient (for example, by how much has a particular patient who forgets to take medication improved his or her ability to remember to take medication). The information thereby gained will be of importance for the patient, who may now be benefiting from improved performance in taking medication, and the carers (who may include therapists and family), who will be sharing in the improved situation arising from the better performance in taking medication. It also follows that the effectiveness of a particular cognitive rehabilitation program, as practiced by a cognitive neuropsychologist, which, as we pointed out previously, will focus on impairments, will be measured by a reduction in a particular impairment, such as inability to name objects as indicated by a particular naming test. Now this information may be of little consequence to the patient or the patient’s family, and may mean very little to staff treating the patient, unless there has been a subsequent and measurable improvement in everyday language skills.

Fig. 1. An illustration of pathology, impairment, disability and handicap, and how a person with head injury and a person with stroke might be affected (adapted from Whyte, in press).
The cognitive rehabilitation program may of course treat impairments in the hope, or even expectation, that disabilities will also be reduced, but there is little evidence in fact that such reduction occurs. Although Diller and Gordon (1981) found that teaching stroke patients to carry out block design tasks resulted in improved dressing skills, it is hard to find evidence that this approach works for patients with multiple impairments, such as those who form the majority of brain injured people. Furthermore, Whyte (in press) points out that there are no data to support the view that cognitive impairment is related to cognitive disability. Taking memory as an example, dysfunction is usually identified by performance on memory tests that assess impairment. The Wechsler Memory Scale–Revised (Wechsler, 1987) is considered to be a reasonably good test of memory impairment, but it does not correlate with memory performance in real life (Wilson, 1991a). In other words, the WMS–R does not measure disability, and does not therefore address rehabilitation issues. The Rivermead Behavioural Memory Test (Wilson et al., 1985), on the other hand, measures disability in that it includes analogues of real life tasks. Thus it reflects real life problems (Wilson et al., 1989) and is a good predictor of both independence (Wilson, 1991a) and employment (Schwartz & McMillan, 1989).

As far as cognitive rehabilitation is concerned, we should be attempting to remediate disability rather than impairment or, at least, demonstrate that treatment of impairment results in reduction of disability.

How is Cognitive Rehabilitation Carried Out Today?

In Europe, North America, and Australasia, there would appear to be four main approaches to cognitive rehabilitation:

1. those focusing on cognitive retraining through drills and exercises;
2. those based on models from cognitive neuropsychology;
3. those combining theory and practice from neuropsychology, cognitive psychology, and behavioral psychology;
4. those using a holistic approach by addressing emotional, motivational, and other noncognitive aspects of functioning, in addition to cognitive aspects.

The cognitive retraining approach

The assumption behind this approach seems to be that it is possible to remediate underlying cognitive deficits (or at least to teach patients how to deal with their cognitive problems) by exercise, practice and stimulation. It is therefore akin to the “mental muscle” approach (Harris & Sunderland, 1981), which assumes that appropriate cognitive exercises can improve cognition in the same way that physical exercise can improve physical well-being and muscle tone. Such programs typically involve the presentation of patients with a cognitive exercise regime to work through. The exercises are often computerized. Gianutsos (1980) described one such treatment for a woman in her 40s who had memory, perceptual, and reading problems following a meningioma and a stroke. Gianutsos reported that, in total, 23 cognitive rehabilitation sessions were conducted with this patient, both before and after discharge from the hospital to her home. The sessions lasted from 45 min to 2 hr, and occurred within a 2-month period, except for a follow-up session 5 months later. Cognitive retraining was organized around two tasks: (1) memory for short lists of three unrelated words, with varying amounts of interference in the recall interval; and (2) oral reading and recall of paragraphs.

Many American programs seem to follow the exercise, stimulation, and practice model, including the original Diller (1976) program, in which patients were taken through a series of training models to improve, for example, visual information processing or spatial awareness. Others who use a retraining exercise approach include Parenté et al. (1989), who developed an “iconic memory scanning” training to improve “iconic retention”; Adamovich et al. (1985) and Sohberg and Mateer (1989), who describe a range of exercises for improving various cognitive deficits; and Lynch (1982), Bracy (1986), Gianutsos and Kiltzner (1981), and others, who describe computerized cognitive retraining programs.

What is wrong with the retraining through exercises approach?

The main problem with this approach is connected with a distinct lack of evidence of its effectiveness. Miller (1984) found little evidence of success for the stimulation, exercise, and drilling approach. Wilson (1982) reported no effect of exercise on memory functioning, a finding supported by Glisky (1995). In a fairly comprehensive review of computerized cognitive rehabilitation, Robertson (1990) found no evidence of significant changes in memory, visuoperceptual, or visuospatial functioning as a result of computerized training. Language training programs for highly specific disorders fared a little better, although there was no published evidence of more general effectiveness of computerized language training. Only in attention training were there some positive results, although even here the results were contradictory, with some studies reporting positively and others negatively.

Since Robertson’s (1990) review paper, further computerized attentional training programs have appeared in support of the tentative evidence available in the 1980s. Gray et al. (1992) found that, on a number of outcome measures, a group of brain injured patients receiving computerized attentional retraining were marginally better than a control group of brain injured patients receiving recreational computerized training. However, 6 months later the experimental group did significantly better than the control group on two tests of attention. Sturm and Willmes (1991) gave computerized training to right and left hemisphere damaged stroke patients. Right hemisphere damaged patients showed more pronounced impairments of sustained attention and vig-
Cognitive rehabilitation

4. This approach lacks any theoretical underpinning.

1. It fails to address the functional manifestations of cognitive problems as experienced by brain injured patients in real life; that is, it tackles impairments rather than disabilities. Learning lists of words or identifying particular stimuli on a computer screen is not of any particular concern to brain injured people.

2. The approach fails to address generalization problems. The only point to "cognitive retraining" would be if improvements on the training tasks generalized to real life, but to date, we have no convincing evidence of this. Furthermore, without such evidence, it would seem wrong to build in unnecessary steps for brain injured clients, who typically have problems learning, especially when they could be taught directly the information or skills they require for real life functioning.

3. Emotional, social, and behavioral sequelae of brain injury are ignored, yet these can be just as handicapping as cognitive difficulties (McKinlay et al., 1981; Thomsen, 1985). Patients and families are sometimes in danger of exploitation through unscrupulous companies, selling computers and software to people desperately hoping for some improvement in their daily lives.

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Cognitive neuropsychological
theoretical approaches

These approaches use a cognitive model, typically of language or reading, to identify the specific deficit of an individual patient. The deficits are often very precisely identified by the models. The underlying rationale would appear to be that, once a deficit can be identified, it can be treated. In the words of Coltheart (1991),

One needs to have in mind a model of how naming is normally achieved before one can begin to seek to understand impairments of naming consequent upon brain damage; and one needs this understanding before one determines what kinds of treatment could be appropriate. (pp. 216–7)

In the United Kingdom and some other European countries this approach is held in high esteem. The eminent proponents are Coltheart (1991, 1994), Riddoch and Humphries (1994), Seron et al. (1991), and Mitchum and Berndt (1988, 1995). A typical rehabilitation program within this approach would involve a careful assessment (following one’s particular model) to identify the component(s) of the model that are dysfunctional. Having carefully analyzed the deficit "the treatment is selected specifically to fit in with the theoretical interpretation of the functional impairment" (Mitchum & Berndt, 1995, p. 7). The treatment itself, however, is typically practice at the damaged component of the model. Although we saw earlier that practice is not a good rehabilitation strategy, it would be argued by cognitive neuropsychologists engaged in rehabilitation that the drilling, practice, and exercising approach fails because it fails to identify the damaged component precisely enough.

Even among cognitive neuropsychologists there are criticisms of this approach. Caramazza (1989) remained unconvinced of the value of models for rehabilitation. Wilson and Patterson (1990) claimed that the recent interest in treatment on the part of neuropsychologists has been almost entirely for the benefit of the scientist rather than the patient. Baddeley (1993) suggests that cognitive neuropsychology has learned a great deal from the study of brain damaged patients over the past 20 years, but it is by no means clear that brain damaged patients have benefited from cognitive neuropsychology.

What is wrong with the theoretical cognitive neuropsychology approach?

One of the major problems with this approach is that, while cognitive neuropsychological models are extremely useful in identifying the nature of the deficit, and for explaining observed phenomena, they provide little or no information on ways of treating the deficit (Wilson & Patterson, 1990). In other words, they tell us what to treat but not how to treat. Or, putting it in the terms we have been using in this paper, this approach can be extremely good at identifying the impairment, but has little or nothing to offer when it comes to treatment of the disability, which, as I have previously argued in this paper, is the business of rehabilitation.

Furthermore, the theoretical cognitive neuropsychology approach is best suited to patients with relatively pure deficits. Indeed, rehabilitationists adopting models from cognitive neuropsychology typically seek out such patients, and typically report single cases. Of course single cases are invaluable for confirming or disconfirming theories (Shalice, 1979), and as Caramazza (1989) wrote, "Experimental research with brain damaged patients ... has had as its explicit goal that of informing theories of normal cognitive functioning" (p. 384). For many cognitive neuropsychologists, the raison d’être for their interest in rehabilitation is to develop, extend, or modify their models. In clinical practice, the majority of brain damaged patients have multiple deficits, and for this group, theoretical models have been less useful.

Because theoretical models tend to focus attention on test performance rather than ways in which cognitively im-
paired people function in everyday life, they are like retraining models focusing on impairment rather than disability. Patients rarely want or need to improve scores on tests in the face of far greater demands requiring them to function more efficiently in real life; in family, social, and vocational settings. If the subsequent cognitive rehabilitation offered by the theoretical cognitive neuropsychological approach were successful in terms of these real life needs of patients, then I would have one less objection to them, but so far there is little evidence of this happening. Typically, improvements on test scores are provided as evidence of success, rather than some of the more functional measures such as reading for pleasure, greater confidence in using the telephone, or engaging more often in conversation.

My opposition is not aimed at the models per se, and indeed, regarded as tools that have enabled us to come to a greater understanding of the nature of a number of cognitive impairments, I am deeply appreciative. Like Caramazza and Hillis (1993), however, I would argue that understanding on a theoretical level, although essential, is not a sufficient requirement on its own to address rehabilitation as conceived of by the World Health Organization (1986), when they describe it as “enabling people to achieve optimum social integration” (p. 1). Cognitive neuropsychological approaches fail to address emotional, social or behavioral sequelae of brain injury yet, as we noted earlier, these are often more handicapping than the cognitive if not addressed properly.

The combined approach: Learning theory, cognitive psychology, and neuropsychology

This approach is perhaps practiced most in the United Kingdom, and probably reflects British clinical psychology training. Most British neuropsychologists working in the Health Service (and therefore in rehabilitation) have been trained as clinical psychologists who have then gone on to specialize in neuropsychology. The clinical psychology training is generic, with all students spending part of their time working in adult mental health, child services, and learning disability. In addition to these compulsory placements, students choose three of four specialist placements, which may include neuropsychology. The academic part of the training would typically include cognitive psychology, neuropsychology, learning theory (and behavior modification), developmental psychology, psychotherapy, abnormal psychology, statistics, and research design. In many courses, the basic philosophy is one that recognizes that clinical psychologists are trained to solve health service problems. We are not allowed to say a patient is untreatable or untreatable; instead, we should use a problem-solving strategy to find a way to assess or treat, or refer to the right service or department. Finally, within this tradition, clinical psychologists are expected to be research oriented, and to evaluate the efficacy of their intervention programs.

A behavioral approach is usually incorporated into neuropsychological rehabilitation because it provides a structure; a way of analyzing a problem, of assessing everyday manifestations of difficulties, of evaluating the efficacy of treatment—and because there are numerous treatment strategies that can be modified or adapted for brain injured patients (Lincoln, 1978; Wilson, 1987, 1989b, 1991b). Although formal behavior modification programs are used in some centers (e.g., Wood & Eames, 1981; Wood, 1987), many psychologists engaged in cognitive rehabilitation are less inclined to use the more rigid behavioral approaches of Skinner (1953) or Kazdin (1975), and more inclined to use elements such as task analysis and behavioral assessment, together with other strategies such as anxiety management and systematic desensitization.

However, behavioral approaches are not in themselves sufficient for our purposes in cognitive rehabilitation. A better understanding of theory and the organization of the brain are required; hence the incorporation of cognitive psychology and neuropsychology into the programs. Ponsford et al. (1995) also use this broad approach in their work in Australia.

Wilson (1984, 1987) put forward the case for the combined approach, although Lincoln (1978) had earlier used behavioral elements in neuropsychological rehabilitation, as indeed had Ince (1976, 1980). Robertson (1988, 1990) also comes from this school, although he perhaps emphasizes the cognitive and neuropsychological aspects rather more than the behavioral.

The basic principle upon which this approach is based is that the everyday problems of brain injured patients can be reduced. If the patient–client fails to learn or fails to change, it is the psychologist who is at fault for not finding the right strategy. The main strengths of this approach are perhaps its emphasis on monitoring, record keeping, and evaluation of success or failure.

What is wrong with the combined approach?

To the outside observer, the main problem would appear to be that this approach fails to address the patient’s emotional needs. Prigatano (personal communication, 1993) says that the approach does not consider the patient’s feelings. In practice, this criticism is perhaps more apparent than real, as the patient’s concerns and anxieties are frequently addressed. Anxiety management strategies, particularly desensitization and relaxation, are commonly employed. In many programs, patients are involved in setting their own rehabilitation goals, in monitoring their treatment, and in taking control of their own therapy. Nevertheless, it is true to say that patients’ feelings, emotions, and their self-esteem are not, as a rule, formally seen as part of their cognitive rehabilitation. Furthermore, it is common practice to focus on one aspect of cognitive dysfunction, such as memory, attention, or reading, rather than address a broader spectrum.

The holistic approach

The holistic approach pioneered by Diller (1976), Ben-Yishay (1978) and Prigatano (1986) “... consists of well-
integrated interventions that exceed in scope, as well as in kind, those highly specific and circumscribed interventions which are usually subsumed under the term ‘cognitive remediation’” (Ben-Yishay & Prigatano, 1990, p. 400). Proponents of the holistic approach regard it as futile to separate the cognitive, the psychiatric, and the functional from the affective sequelae of brain injury (Ben-Yishay et al., 1985). Ben-Yishay’s model follows a hierarchy of stages through which the patient must work in rehabilitation; namely, engagement, awareness, mastery, control, acceptance, and identity.

Major themes of the daily programs include increased awareness, acceptance and understanding, cognitive remediation, development of compensatory skills, and vocational counseling. The rehabilitation day typically starts with a morning meeting of staff and patients, with the rest of the day structured around individual and small group therapy, together with a further meeting of all staff and clients. The individual sessions include cognitive training, psychotherapy, and other specific therapies as required (e.g., speech and language therapy or relaxation therapy).

Group therapy also covers cognitive therapy and psychotherapy, plus special groups as required (e.g., problem-solving or communication). A relatives’ group is held once a week, and vocational counseling and work trials are usually included.

There is increasing evidence that these programs result in less emotional distress, increased self-esteem, and greater productivity for participants than is observed in those patients who do not undergo such treatment (Prigatano, 1986, 1994), as well as evidence that these programs are cost-effective (Mehlbye & Larsen, 1994).

However, it is harder to find evidence directly comparing more than one of the four approaches described in this paper, although an interesting study by Rattock et al. (1992) looked at a comparison of different treatment mixes within a holistic program. They compared the different intensity of treatments for three groups of brain injured patients. All groups achieved the same success rate in terms of employment at 6 months post follow-up. The groups differed, however, in that those who spent most time in cognitive rehabilitation did better on cognitive tasks, those who spent more time on interpersonal skill training did better on tasks involving interpersonal skills, and those trained on both improved on both.

What is wrong with the holistic approach?

Clinically, there appears to be little wrong with this approach. It is hard to find irrefutable evidence of its success but it has probably been subjected to more research on efficacy than other approaches (Diller, 1994), and, as Cope (1994) says, “Although none of the outcome research provides definitive proof of rehabilitation efficacy, the sum of many studies . . . provides reasonably convincing evidence that comprehensive rehabilitation does make a substantial difference in outcome of handicap for TBI (traumatic brain injury) patients” (p. 218).

The holistic approach does not come cheaply. There are usually some 8 to 10 full-time qualified professional health service staff for 12 to 15 patients but, on the other hand, Cope et al. (1991) estimated the annual savings in care for moderately brain injured people was over $14,000, and for severely brain injured people the saving was above $41,000. Mehlbye and Larsen (1994) found that in Denmark, where a holistic program has been in operation since 1985, savings in health and social care were recouped in 5 years.

Good as the holistic programs are, it is probably true to say they can be improved. Incorporating some of the positive aspects from the combined learning theory, cognitive psychology, and neuropsychology programs mentioned earlier might, for example, enhance their clinical effectiveness. Careful task analysis, baseline recording, monitoring, and the implementation of single case experimental designs should enable us to evaluate more easily the successes and failures. The implementation of theoretical models to (1) identify cognitive strengths and weaknesses and (2) explain observed phenomena should extend the boundaries of achievement for cognitive rehabilitation programs.

What do we need to ensure effective and ethical cognitive rehabilitation?

1. In the light of the discussion immediately above, and the fact that feelings affect how we think and how we behave, we need to recognize that cognition should not be divorced from emotion, motivation, or other noncognitive functions. Consequently, an integrated program should address not only cognitive functions but also social, emotional, functional, and affective difficulties.

2. Programs should focus on disability rather than impairment. Effectiveness should not be evaluated by improvements on test results.

3. Cognitive neuropsychologists engaged in rehabilitation should encourage dialogue with other disciplines. We typically conduct diagnostic studies or experiments to elucidate and clarify the nature of impairment. Other rehabilitation staff are typically concerned with the remediation of real life problems and in helping brain injured people manage their disabilities. The challenge of those engaged in cognitive rehabilitation is to develop concepts, tools, and terminology to bridge these different interests.

4. We need a broader theoretical spectrum on which to base our rehabilitation programs. Wilson (1984, 1987) argued for the need to combine theoretical models and methodology from neuropsychology, cognitive psychology, and behavioral psychology. Diller (1987) said, “While current accounts of remediation have been criticised as lacking a theoretical base, it might be more accurate to state that remediation must take into account several theoretical bases” (p. 9). More recently, McMillan and Greenwood (1993) said, “Rehabilitation should draw on fields of clinical neuropsychology, behavioural analysis, cognitive retraining and group and individual psychotherapy” (p. 352).
5. We need to strengthen the interaction between theory and clinical observation. Theory can sometimes predict which methods might work, but clinical observation is often required to tell us how best to implement the theory. For example, work on errorless learning in the rehabilitation of amnesic patients (Baddeley & Wilson, 1994) grew out of theoretical work on implicit memory. The implementation of errorless learning principles in clinical rehabilitation, however, requires behavioral observation and analysis at an individual patient level (Wilson et al., 1994; Wilson & Evans, 1996).

6. We need to ensure proper evaluation of cognitive rehabilitation programs at both focal and global levels (Whyte, in press). Given that patients and therapists cannot be “blind” to treatment procedures, double blind randomized control trials are always unlikely to be realized in neuropsychological rehabilitation. Single blind trials are sometimes possible (Cope, 1994). Even more possible are small group or cohort studies, crossover designs, and single case experimental designs (Wilson, 1997, discusses research and evaluation in rehabilitation in some detail).

In conclusion, and to quote a British politician, the late Sir Keith Joseph, speaking when the first chair of rehabilitation was established in the United Kingdom, “An improvement in rehabilitation can mean more to millions of people than almost any other medical advance” (Joseph, 1973).

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